# CURRENT LITERATURE

## BOOK REVIEWS

### Root systems

WEAVER[1] has made another notable contribution to our knowledge of root systems. Former investigations, noted in this journal,[2] included many root systems of grassland plants, and the present publication is confined to grassland vegetation and to the crop plants grown within its limits. The grasslands are considered under the three subdivisions of true prairie, mixed prairie, and short-grass plains.

The true prairie is characterized by tall sod-forming grasses growing in soil of rather abundant water content, with greater moisture in the subsoil. On the basis of root development, three general classes may be recognized in grassland vegetation. In the first the "working depth," or average depth reached by a large number of roots, is about 1.5 feet, with a maximum depth of 3.3 feet. The second class possesses roots with a working depth of 3.3 feet and a maximum of about 6 feet; while in the third class the working depth of the roots is usually 5–8 feet and the maximum penetration 8–12 feet, with a few species reaching an extreme of 15–20 feet. Examples of the three classes are *Aristida oligantha*, *Elymus canadensis*, and *Koeleria cristata; Andropogon scoparius*, *Bouteloua gracilis*, and *Grindelia squarrosa;* and *Andropogon furcatus*, *Aster multiflorus*, and *Panicum virgatum*. The deeper rooted species have few roots in the surface layers of the soil, showing a grouping of roots into more or less definite layers, thus reducing competition and permitting the growth of a larger number of species. In the short grass plains practically all plants have root systems well adapted for water absorption from surface soils. Two have roots with a working depth less than 2 feet, three have working depths of 2–4 feet, and three have a range of 4–7 feet. Examples of the three classes are *Opuntia polyacantha*, *Bulbilis dactyloides*, and *Psoralea tenuifolia*. Here the water supply is much more limited, especially in the subsoil. The soil and moisture conditions, as well as the vegetation in the mixed prairie, are intermediate between the true prairie and the short-grass plains. Compared with the true prairie, the plants are not as deeply rooted, but have usually developed a very efficient and widely spreading absorbing system in the surface soil.

The root systems of cereal crops grown at many stations in true and mixed prairie and short-grass plains were also examined. The comparative amount

[1] WEAVER, JOHN E., Root development in the grassland formation. Carn. Inst. Wash. Publ. 292. pp. 151. *pls. 23. figs. 37.* 1920.

[2] BOT. GAZ. **69**:351–353. 1920.

of root development of cereals in each seems to be in true prairie 100 per cent, in mixed prairie 80–95 per cent, and in short-grass plains 51–79 per cent. The experimental data are given in the form of tables, drawings, and photographs, all of excellent quality. It is recognized that variations in root development are caused by various factors, such as the chemical and physical character of soils and the evaporating power of the air. The soil factors are most effective through water content and aeration. The water relations of the various habitats were examined by WEAVER by means of atmometers and by soil moisture determinations, the latter being interpreted by means of the wilting coefficient and hygroscopic coefficient. He calls attention to the recognized fact that many plants are able to continue to absorb water below the limits of the wilting coefficient. In fact, it is in the responses of different plants to the use of soil moisture lying between the limits of the wilting and the hygroscopic coefficients that differences appear which might be used with advantage for a most significant classification. All wilting, whether clearly manifest or not, takes place at about the same moisture content, that is, at the wilting coefficient. As the moisture passes below this point the hydromesophytes soon die, the mesophytes live for a somewhat longer time, while xerophytes or drought-resistant plants prolong their existence for a very considerable period, reducing the soil moisture to the hygroscopic coefficient. It seems rather clear from the work of ALWAY and others, however, that the water absorbed below the limits of the wilting coefficient is quite insufficient for growth and merely serves to sustain life, indicating that the term "growth water" has been correctly used by the reviewer and others for the amount of soil moisture in excess of that indicated by the wilting coefficient.

While all of WEAVER's investigations of root development have been of the highest order, this report shows a decided advance, for the accumulation of data has become sufficient to permit some significant generalizations. Among other things he points out that as our knowledge of root development in various associations increases it will render more accurate our interpretation of the indicator significance of the natural vegetation. Thus the contribution he has made to the science of ecology becomes most useful in the practice of agriculture.—GEO. D. FULLER.

### Sturtevant's notes on edible plants

The purpose of this large volume,[3] as indicated in the preface, is that new knowledge may be available as follows: (1) the original home of many esculents is given for the first time; (2) new landmarks in the histories of edible plants are pointed out; (3) an effort is made to mention all cultivated esculents; (4) although the book contains much new information as to the history of the

[3] HEDRICK, U. P. (editor), STURTEVANT's notes on edible plants. Report N.Y. Agric. Exper. Sta. for 1919. 2:4to. pp. vii+686. Albany: J. B. Lyon Co., State printers. 1919. $2.75.